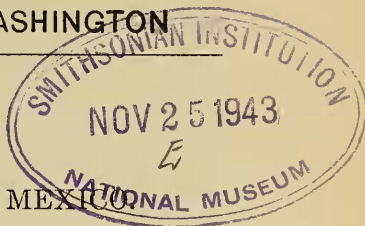


PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON



NINE NEW GRASSES FROM MEXICO

BY JASON R. SWALLEN.

The grasses herein described in the genera *Bromus*, *Sporobolus*, *Muhlenbergia*, *Stipa*, *Bouteloua*, and *Andropogon* were among recent collections of Ivan M. Johnston, C. H. Muller, and Robert M. Stewart in Coahuila, and Virginius H. Chase in Nuevo Leon.

Bromus pinetorum Swallen, sp. nov.

Perennis 80-120 cm. altus; culmi erecti, infra nodos retrorse pilosi; vaginae internodiis breviores, dense villosae; ligula 1-2 mm. longa; laminae 25-32 cm. longae, 5-10 mm. latae, firmae, utrinque pilosae; paniculae 20-25 cm. longae, ramis arcuatis, scabris, basi nudis, inferioribus usque ad 15 cm. longis; spiculae 2.5-3 cm. longae, 3-7 mm. latae, 7-9-florae; glumae acuminatae, pilosae, prima angusta, 7-9 mm. longa, 1-nervis, secunda latior, 10-11 mm. longa, 3-nervis, arista 1 mm. longa; lemmata 10-11 mm. longa, obtusa, hirsuta, arista 5-8 mm. longa, scabra; palea lemma aequans, carinis minute ciliatis, inter carinas pubescens.

Perennial, 80 to 120 cm. high; culms erect, retrorsely pilose below the nodes; sheaths mostly shorter than the internodes, densely and softly villous; ligule brown, 1 to 2 mm. long; blades 25 to 32 cm. long, 5 to 10 mm. wide, firm, usually densely pilose on both surfaces; panicles 20 to 25 cm. long, apparently nodding, the branches in 2's or 3's, rather stiff but probably arcuate-spreading, densely scabrous, the lowermost as much as 15 cm. long, undivided for as much as 5 cm. from the base, the few branchlets bearing 1 or 2 spikelets; spikelets 2.5 to 3 cm. long, 3 to 7 mm. wide, 7-9-flowered; glumes acuminate, usually pilose, especially along the margins, the first narrow, 7 to 9 mm. long, 1-nerved, the second much broader, 10 to 11 mm. long, 3-nerved, with an awn about 1 mm. long; lemma 10 to 11 mm. long, rounded, obtuse, rather evenly hirsute across the back from base to apex, the awn 5 to 8 mm. long, stout, straight, scabrous; palea as long as or slightly longer than the lemma, pubescent, finely ciliate on the keels with short hairs 0.1 mm. long; rachilla appressed-hirsute.

Western Coahuila, Sierra del Pino, vicinity of La Noria, open valley with scrub oaks and scattered pines; shaded deep arroyo, Aug. 20-26,

1940, I. M. Johnston & C. H. Muller 497 (type, herb. U. S. Nat. Arbo-
retum 145089); Sierra de la Madera, vicinity of "La Cueva," Charretera
Canyon, Johnston 8926.

Sporobolus spiciformis Swallen, sp. nov.

Perennis, 40-60 cm. altus; culmi caespitosi, erecti, glabri; vaginae internodiis longiores, glabrae; ligula dense ciliata, 0.3 mm. longa; laminae 7-20 cm. longae, ca. 2 mm. latae, planae vel involutae, firmae, flexuosae; paniculae spiciformes, 9.5-13 cm. longae, 3-4 mm. latae, erectae, pallentes; spiculae 1.8-2 mm. longae, glabrae; glumae subaequales, 0.8-1.3 mm. longae, tenues, hyalinae, obtusae, minutae erosae; lemma 1.8-2 mm. longum, obtusum, minute erosum; antherae 1.3 mm. longae.

Perennial, 40 to 60 cm. high; culms in rather tough clumps, erect or nearly so, glabrous; sheaths rounded, mostly longer than the internodes, glabrous; ligule densely ciliate, 0.3 mm. long; blades 7 to 12 cm. long, or those on the innovations to 20 cm. long, or sometimes longer, about 2 mm. wide at the base, flat or becoming involute, firm, usually flexuous; panicles spikelike, 9.5 to 13 cm. long, 3 to 4 mm. wide, erect, pale; spikelets 1.8 to 2 mm. long, glabrous; glumes subequal, 0.8 to 1.3 mm. long, thin, hyaline, subacute or obtuse, entire or minutely erose; lemma 1.8 to 2 mm. long, obtuse, minutely erose; palea as long as the lemma, glabrous; anthers 1.3 mm. long.

Puerto del Norte, Cuatro Cienegas, Coahuila, 1460 m. alt.; July 18, 1939, Leroy H. Harvey 1225 (type, U. S. Nat. Herb. 1763006); alkaline flats, 4 miles west of Cuatro Cienegas, common, Johnston 7132; 4 km. southeast of Laguna del Rey, road from Guimbalet to Acatita, abundant on salt flat, Stewart 2654.

This species resembles *Sporobolus phleoides* Hack. of Argentina, which is a coarser grass with blades as much as 5 mm. wide, and spikelets 1.5-1.6 mm. long, the glumes and lemma acuminate rather than obtuse, the palea shorter than the lemma, and the anthers only 0.3 mm. long.

Muhlenbergia publigluma Swallen, sp. nov.

Perennis, 75-90 cm. alta; culmi erecti, dense caespitosi infra nodos dense pubescentes; vaginae compressae, carinatae, scaberulae, internodiis longiores; ligula 5-7 mm. longa, decurrens; laminae usque ad 35 cm. longae, 2-2.5 mm. latae, attenuatae, scabrae; paniculae 20-25 cm. longae, 1 cm. latae, densae, ramis gracilibus, appressis, ad basin floriferis; spiculae 2.5-3 mm. longae, breviter pedicellatae; glumae aequales, 2-2.5 mm. longae, obtusae, scabrae vel pubescentes; lemma 2.5-3 mm. longum in parte inferiore pilosum pilis appressis, in parte superiore scabrum, exaristatum vel arista ca. 0.5 mm. longa; antherae 1.5 mm. longae.

Perennial, 75 to 90 cm. high; culms densely tufted, erect, glabrous, densely pubescent below the nodes; sheaths compressed, keeled, scaberulous, usually longer than the internodes; ligule 5 to 7 mm. long, thin, decurrent; blades conduplicate, as much as 35 cm. long, 2 to 2.5 mm. wide unfolded, attenuate to a rather fine point, firm, scabrous, more or less flexuous toward the tip; panicles 20 to 25 cm. long, about 1 cm. wide,

dense but interrupted below, the slender branches appressed, floriferous to the base, the lower ones about 4 cm. long; spikelets 2.5 to 3 mm. long, plumbeous, short-pedicellate, the pedicels scabrous; glumes equal, 2 to 2.5 mm. long, broad, obtuse, scabrous to pubescent in lines; lemma 2.5 to 3 mm. long, densely appressed-pilose below, scabrous in lines above, awnless or usually with an awn about 0.5 mm. long; anthers 1.5 mm. long.

Municipio de Cuatro Cienegas, Sierra de la Madera, Cañon del Agua, Coahuila, common in shrub zones of lower canyon, Sept. 10, 1939, C. H. Muller 3264 (type, herb. U. S. Nat. Arboretum 145092).

This species is related to *Muhlenbergia pubescens* (H. B. K.) Hitchc., which is much stouter, with panicles as much as 40 cm. long, the branches naked at the base, and spikelets 3–4 mm. long, the glumes of which are as long as or slightly longer than the lemma.

Stipa alta Swallen, sp. nov.

Perennis 1.8 m. alta; culmi robusti, erecti, glabri; vaginae glabrae vel minute scabrae, inferiores internodiis longiores, superiores elongatae internodiis breviores; ligula 4–8 mm. longa, alba; laminae usque ad 60 cm. longae, 7 mm. latae, firmae, planae, nervosae, scabrae; paniculiae ca. 28 cm. longae, 1.5 cm. latae, densae, ramis appressis in parte inferiore nudis, usque ad 10 cm. longis; glumae acuminatae, 3-nerves, prima 10–11 mm. longa, secunda 7–8 mm. longa; fructus 4–5 mm. longus, brunneus, pilosus pilis albis; callum pungens, 0.5 mm. longum, breviter barbatum; arista 8–12 mm. longa, 1–2-geniculata, infra geniculum tortuosa.

Perennial, 1.8 m. high; culms rather stout, erect, glabrous; sheaths glabrous or minutely scabrous, the lower ones overlapping, the upper ones elongate, shorter than the long internodes; ligule prominent, 4 to 8 mm. long, white; blades as much as 60 cm. long, 7 mm. wide, the uppermost much smaller, very firm, flat but becoming rolled at least in drying, long-attenuate, strongly nerved, very scabrous especially on the lower surface and on the margins; panicle 28 cm. long, about 1.5 cm. wide, rather dense, the branches appressed, at least some of them naked at the base, the lowest ones as much as 10 cm. long; glumes acuminate, 3-nerved, hyaline toward the tip, the first 10 to 11 mm. long, the second 7 to 8 mm. long; fruit 4 to 5 mm. long, dark brown, pilose with white hairs, the callus sharp, less than 0.5 mm. long, short-barbate; awns 8 to 12 mm. long, relatively stout, once- or obscurely twice-geniculate, tightly twisted below the bend, the terminal segment straight.

Municipio de Cuatro Cienegas, Sierra de la Madera, Cañon del Agua, Coahuila, rare in dry shrub zones of lower canyon, Sept. 10, 1939, C. H. Muller 3261 (type, herb. U. S. Nat. Arboretum 145097).

This is one of the few species of *Stipa* having a long ligule. This character, and the long, broad, stiff blades, readily identify it.

Bouteloua johnstoni Swallen, sp. nov.

Perennis 25–45 cm. alta; culmi dense caespitosi, erecti, basi decumbentes, simplices vel pauciramiosi, scaberuli, sparse pilosi; vaginae interno-

diis longiores, sparse vel dense pilosae vel villosae; ligula ciliata, 0.3 mm. longa; laminae 10–15 cm. longae, firmae, involutae, pungentes, recurvatae, supra prope basin sparse vel dense villosae; spicae 6–12, 1–1.7 cm. longae, pectinatae, patentes vel reflexae, 7–11-spiculatae; spiculae 8–9 mm. longae, flore perfecto 1, floribus reductis 2; gluma prima 2 mm. longa, 1-nervia arista gracili 1.5 mm. longa; secunda 6–8 mm. longa, latior, acuta vel minute dentata 1–3-nervis, scabra et prope basin pubescens vel villosa, marginibus tenuibus, hyalinis; lemma fertile 6–7 mm. longum, dorso glabrum ad margines sparse pilosum, 3-lobatum, lobis 3 mm. longis; lemmata sterilia multo reducta, aristis planis quam glumis paulo longioribus.

Densely tufted perennial 25 to 45 cm. high; culms stiffly erect, or decumbent at the base, simple or branching at the lower nodes, scaberulous, with a few scattered soft hairs; leaves crowded toward the base; sheaths all longer than the internodes, rounded, sparsely to rather densely pilose or villous; ligule ciliate, about 0.3 mm. long; blades mostly 10 to 15 cm. long, or the uppermost much shorter, firm, involute, pungent, recurved-spreading, narrower at the base than the mouth of the sheath, sparsely to rather densely villous, especially on the upper surface toward the base; inflorescence long-exserted, much exceeding the blades, 5 to 12 cm. long, composed of 6 to 12 somewhat distant, readily deciduous spikes, the axis prolonged beyond the upper spike in a naked bristle; spikes 1 to 1.7 cm. long, pectinate, spreading or finally reflexed, deeply tinged with purple, bearing 7 to 11 spikelets, the uppermost often much reduced; spikelets 8 to 9 mm. long, divergent from the rachis at a 45° angle, containing 1 fertile and a rudiment composed of two reduced sterile florets; glumes very unequal, the first about 2 mm. long, thin, 1-nerved, bearing a slender awn about 1.5 mm. long, the second 6 to 8 mm. long, much broader than the first and nearly enclosing the florets, acute or minutely dentate, 1- or obscurely 3-nerved, scabrous and pubescent or pilose toward the base, glabrous above, the margins thin, usually hyaline; lemma of fertile floret 6 to 7 mm. long, parted at the summit into 3 awn-like lobes, the central about 3 mm. long, the lateral ones a little shorter, the body of the lemma glabrous on the back, sparsely pilose toward the margins; rudiment composed of two sterile florets reduced to awns flattened at the base, the awns somewhat exceeding the glumes.

Common on gypsum-beds in western Coahuila. South end of Cañada Oscuro near Tanque La Luz, Sept. 27, 1942, I. M. Johnston 8491 (type, herb. U. S. Nat. Arboretum 154624); Rancho Parritas, base of mountains along eastern margin of the Valle de Acatita, Stewart 2763.

Bouteloua johnstoni is a very distinct species related to *B. chondrosioides* (H. B. K.) Benth. and *B. eludens* Griffiths but is readily distinguished by the characteristic firm, involute, recurved-spreading blades. The spikelets of *B. chondrosioides* and *B. eludens* also contain only 1 fertile floret, but the first glumes are longer and narrower, and the second glumes are conspicuously hairy.

Bouteloua chasei Swallen, sp. nov.

Perennis, 20–30 cm. alta; culmi erecti rhizomatosi; vaginae glabrae vel in marginibus in parte superiore ciliatae, in ore villosae; ligula ciliata 0.2–0.3 mm. longa; laminae involutae, firmae, curvatae marginibus basi villosis; spicae 2–4, pectinatae, 1.5–2.5 cm. longae, distantes, anguste adscendentes vel patentes; spiculae flore perfecto 1; floribus reductis 2; gluma prima 2 mm. longa, acuminata, 1-nervis, glabra; gluma secunda 2–4 mm. longa, acuminata, in parte inferiore dense villosa; lemma fertile 3 mm. longum, villosum, 3-lobatum, arista centrali 1.2 mm. longa, aristis lateralibus 1.5 mm. longis; lemma sterile primum 1 mm. longum lobatum, basi dense barbatum, aristis 2 mm. longis scabris; lemma sterile secundum truncatum, 1.5 mm. longum, non aristatum.

Perennial, 20 to 30 cm. high; culms erect from a knotty rhizomatous base, with a number of rather hard cataphylls at the base; sheaths rounded, glabrous, or the margins ciliate toward the summit, villous in the throat; ligule ciliate, 0.2–0.3 mm. long; blades involute, firm, curved, villous on the margins toward the base; spikes 2 to 4, pectinate, 1.5 to 2.5 cm. long, narrowly ascending to somewhat spreading, scattered on an axis 3.5 to 8 cm. long, the lower ones 2.5 to 4 cm. distant, more or less curved, short-pedicellate, the pedicel densely pubescent; spikelets composed of 1 fertile and 2 rudimentary florets; first glume 2 mm. long, acuminate, 1-nerved, thin, glabrous; second glume 2 to 4 mm. long bluntly acuminate, densely villous below, scabrous above; fertile lemma 3 mm. long, villous all over the back, 3-lobed, the central lobe bifid, awned from between the teeth, the awn 1.2 mm. long, the lateral lobes including the awns about 1.5 mm. long; first rudimentary floret 1.5 mm. long, densely bearded at the base with hairs 1 mm. long, deeply lobed, the awns rather stout, 2 mm. long, scabrous; second rudimentary floret truncate, awnless, 1.5 mm. long.

Mesa, Galeana, Nuevo Leon, 5,400 ft. alt., July 30, 1939, Virginus H. Chase 7673½ (type, U. S. Nat. Herb. 1763078).

This species is related to *Bouteloua karwinskii* (Fourn.) Griffiths which has more slender culms, flat curly blades, and spikes not more than 1.8 cm. long; the second glumes are glabrous, not more than 2 mm. long, while those of *B. Chasei* are villous and mostly 4 mm. long except the ones toward the end of the spikes, which are sometimes only 2 mm. long.

Bouteloua eriopoda var. *eriostachya* Swallen, var. nov.

E Bouteloua eriopoda (Torr.) Torr. gluma secunda villosa differt.

This variety closely resembles the species, differing primarily in having the second glumes rather densely villous. The structure of the spikelets is identical. The specimens at hand do not show any indication that the plants are stoloniferous, but this character is not always evident in the specimens. The culms are a little more conspicuously lanate than in the species.

Frequent on rocky flats, vicinity of Aguaje del Pajarito, canyon at west end of Sierra de la Fragua, 2–3 km. north of Puerto Colorado,

western Coahuila, Sept. 1-3, 1941, I. M. Johnston 8718 (type, herb. U. S. Nat. Arboretum 154692); San Antonio de los Alamos, eastern base of the volcanic Sierra de San Antonio, Johnston 8257.

Andropogon spadiceus Swallen, sp. nov.

Perennis, 60-95 cm. alti; culmi graciles, erecti, glabri; vaginae compressae, carinatae, glabrae vel minute scabrae; ligula 1 mm. longa, truncata, erosa; laminae 10-25 cm. longae, 2-2.5 mm. latae, planae, scabrae; racemi bini, 3.5-5 cm. longi; rachis recta, dense ciliata pilis usque ad 6 mm. longis; spicula sessilis 7-8 mm. longa, spadicea, callo barbato pilis 1 mm. longis; gluma prima acuminata, glabra, apice hyalino, inter carinas 3-5-nervis; lemma fertile hyalinum, bifidum, arista 15-17 mm. longa, 1-geniculata, infra geniculam contorta, segmento terminali 10-12 mm. longo; spicula pedicellata reducta, ca. 4 mm. longa, exaristata.

Perennial, 60 to 95 cm. high; culms slender, erect, glabrous; sheaths compressed, keeled, glabrous or minutely scabrous, the lower ones longer, the upper ones much shorter than the internodes; ligule 1 mm. long, truncate, erose-ciliate; blades 10 to 25 cm. long, 2 to 2.5 mm. wide, flat, scabrous, sometimes with a few long hairs on the margins toward the base; racemes paired at the ends of the simple slender solitary branches from the middle and upper nodes, 3.5 to 5 cm. long, the straight rachis and sterile pedicels obscured by the dense white hairs, these short at the base, becoming longer toward the summit, as much as 5 to 6 mm. long at the tip of the rachis joints and sterile pedicels; sessile spikelets 7 to 8 mm. long, golden or chestnut brown, the callus bearded with white hairs about 1 mm. long; first glume acuminate, glabrous on the back, scabrous on the keels toward the hyaline tip, 3- to 5-nerved between the keels, the nerves green; fertile lemma hyaline, awned from the long teeth of a bifid apex, the awn 15 to 17 mm. long, once-geniculate, tightly twisted below the bend, the terminal segment straight, 10 to 12 mm. long; pedicellate spikelet greatly reduced, about 4 mm. long, awnless.

Northern Coahuila, Cañon de Madera, western side of Sierra de los Guajes, about 4 km. east of Rancho Buena Vista, Sept. 7, 1941, Robert M. Stewart 1504 (type, herb. U. S. Nat. Arboretum 154691); western Coahuila, Sierra de la Madera, vicinity of "La Cueva," 5,300-6,500 ft. alt., I. M. Johnston 9074.

This species can be recognized by brown spikelets which are in sharp contrast to the dense long white hairs of the rachis and sterile pedicels.

Andropogon maderensis Swallen, sp. nov.

Perennis ca. 80 cm. altus; culmi graciles, dense caespitosi, erecti, glabri; vaginae compressae, carinatae, scabrae, eae culmorum internodiis longiores; ligula 1 mm. longa, truncata, minute ciliata; laminae 15 cm. longae, 1.5-2 mm. latae scabrae; racemi solitarii, 3-4 cm. longi, spiculis fertilibus 4-5 in ramis brevibus, gracilibus appressis; spicula sessilis 8 mm. longa, callo glabro; gluma prima acuminata glabra, apice hyalina; arista 1-geniculata, infra geniculam contorta, segmento terminali 5-7 mm.

longo; pedicellus sterilis appressis, spiculam subaequans; spicula sterilis valde reducta, acuminata, ca. 3 mm. longa.

Perennial, about 80 cm. high; culms densely tufted, slender, erect, glabrous; sheaths compressed, keeled, scabrous, all but the lower ones shorter than the internodes; ligule 1 mm. long, truncate, minutely ciliate; blades flat, or conduplicate toward the base, mostly about 15 cm. long, 1.5 to 2 mm. wide, scabrous, especially on the margins; racemes solitary at the ends of the short, usually solitary, slender branches from the middle and upper nodes, 3 to 4 cm. long, the rachis slender but straight, composed of 4 or 5 segments, evenly ciliate with long hairs from the base to the apex; sessile spikelet 8 mm. long, the callus not bearded; first glume 8 mm. long, acuminate, glabrous on the back, the tip hyaline; awn once-geniculate, tightly twisted below the bend, the terminal segment loosely twisted, 5 to 7 mm. long; sterile pedicel appressed, nearly as long as the sessile spikelet, the spikelet greatly reduced, acuminate, about 3 mm. long.

Municipio de Cuatro Cienegas, Sierra de la Madera, Cañon del Agua, abundant in shrub zone of lower canyon, Sept. 10, 1939, C. H. Muller 3262 (type, herb. U. S. Nat. Arboretum 145090).

This species is related to *Andropogon scoparius* Michx., which differs in having longer flexuous racemes, smaller sessile spikelets with the first glume papillose-roughened, and a longer terminal segment of the awn.